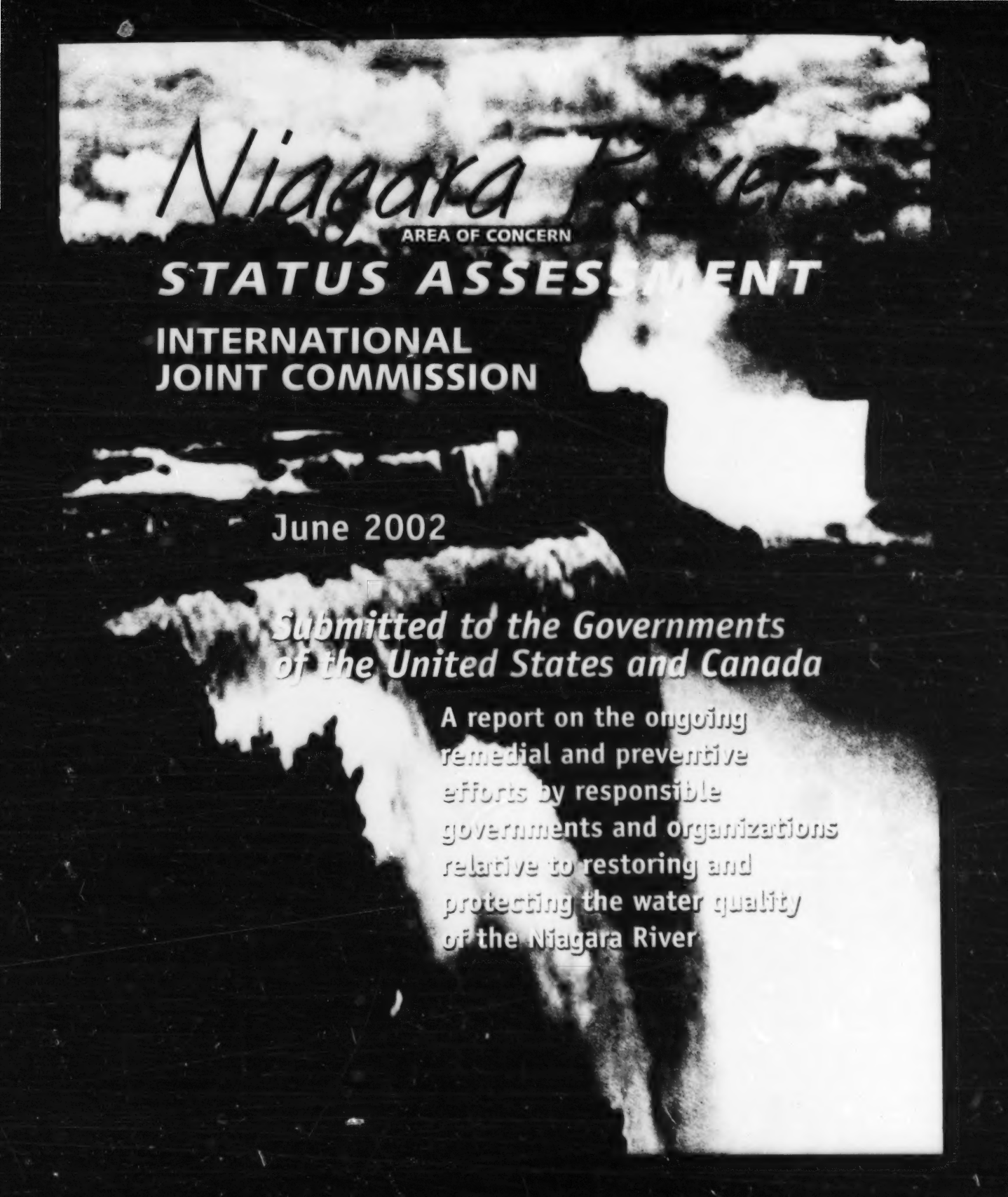

Niagara River

AREA OF CONCERN

STATUS ASSESSMENT

INTERNATIONAL JOINT COMMISSION

June 2002

Submitted to the Governments of the United States and Canada

A report on the ongoing remedial and preventive efforts by responsible governments and organizations relative to restoring and protecting the water quality of the Niagara River

NIAGARA RIVER
Area of Concern
Status Assessment

The International Joint Commission (Commission) was established by the 1909 Boundary Waters Treaty (the Treaty). The treaty recognizes that each country is affected by the other's actions in the lake and river systems along their common border and provides that "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health and property on the other". The primary purpose of the Treaty is to prevent and resolve disputes concerning these shared waters. In 1972, the governments of the United States and Canada signed the Great Lakes Water Quality Agreement (Agreement). In 1978, the two governments signed a new Agreement which included additional commitments to rid the Great Lakes of persistent toxic substances. Its purpose is to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes basin ecosystem. The Commission was given the responsibility to assess and evaluate the governments' programs and progress under the Agreement and assist in its implementation.

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Introduction

Remedial Action Plans and Areas of Concern

In 1987, the United States and Canada (Parties) signed a Protocol that included a commitment to develop and implement, in cooperation with state and provincial governments, Remedial Action Plans (RAPs). The goal of RAPs is to restore and protect beneficial uses in the 42 currently identified Areas of Concern (AOCs) in the Great Lakes basin. The AOCs are geographic areas where human activities have caused or are likely to cause impairment of beneficial uses or the area's ability to support aquatic life. The Protocol states that the Parties will report on progress in restoring AOCs and calls on the Commission to review RAPs being developed and implemented for the identified AOCs in the Great Lakes basin. Pursuant to the amended Agreement, the Commission reviews and comments on RAPs during three stages: first, when the definition of the problem has been completed; second, when remedial and regulatory measures are selected; and finally, when monitoring indicates that impaired beneficial uses have been restored.

The Protocol directs that each RAP embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses and serve as an important step toward virtual elimination of persistent toxic substances and toward restoring and maintaining the chemical, physical and biological integrity of the Great Lakes basin ecosystem. Further, the Parties, in cooperation with state and provincial governments, are to ensure that the public is consulted in all actions undertaken pursuant to Annex 2 of the Agreement.

For over a decade, the Commission has reviewed and assisted in the development of RAPs, and expressed concern with overall progress in the development and implementation of cleanup and prevention strategies in some AOCs. In 1996, the Commission adopted a new initiative called the Status Assessment process to further examine progress toward restoration of beneficial uses in specific AOCs or open lake waters.

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The Status Assessment Process

Status Assessments are intended to: examine and encourage progress toward restoration and protection of beneficial uses; assess program implementation relative to necessary remedial and preventive actions; and identify and make recommendations on specific activities that could be taken to overcome challenges and make measurable progress in restoring beneficial uses in the area. Status Assessments are not comprehensive environmental audits, but rather, assessments of ongoing efforts and activities of the responsible governments and organizations. The Status Assessment process is intended to promote the restoration of beneficial uses through the collection of information and transfer of successful methods and experiences among different AOCs and facilitation of constructive interaction among various agencies and organizations that may have limited opportunity to exchange ideas. The Niagara River AOC Status Assessment is the fourth such assessment undertaken by the Commission.

Current Status Assessment

The Status Assessment of the Niagara River AOC was conducted between May 2000 and April 2002 and included consultation between representatives of the Commission, including Commissioners, staff members and Science Advisory Board members, and citizens, government agencies, local industries, Niagara River Restoration Council, Niagara River Remedial Action Committee, the Tuscarora Nation, and Great Lakes United. This consultation process included a public meeting conducted by the Commission's Science Advisory Board.

The Status Assessment process included an examination of funding, institutional structure, roles of the Parties, jurisdictions and other sectors, and public consultation. This evaluation also examines those activities occurring outside of the RAP structure that foster restoration and protection of beneficial uses within the AOC.

The Niagara River Area of Concern

Background information is provided in the following three sections to assist the public in better understanding the scope of the complex environmental conditions in the Niagara River AOC for which the Parties have taken corrective actions to address.

History of the Niagara River Area of Concern

The Commission's first examined the water quality conditions in the Niagara River in response to a 1912 reference from the governments to examine the extent and causes of pollution in the boundary waters between the United States and Canada. A more specific reference concerning pollution of the Niagara River was received by the Commission from the governments in 1948. Reports in response to these references were issued in 1918 (IJC 1918) and 1950 (Board of Technical Advisers 1950). Subsequently, other issues including the presence of persistent toxic substances were identified in the Niagara River along with other areas of the Great Lakes basin. The 1978 Agreement and the 1987 Protocol required that these problems and others be addressed in the RAPs.

Stage 1 (problem identification) and Stage 2 (selection of remedial measures) RAPs have been prepared for the Ontario and New York portions of the Niagara River AOC. The Implementation Annex of the 1995 Stage 2 Ontario RAP and the accompanying Welland River Watershed Strategy were subsequently made available in November 2000 (Niagara Peninsula Conservation Authority 2000). The Ontario and New York RAP activities operate within the Niagara River AOC independently of each other.

In February 1987, Environment Canada, the U.S. Environment Protection Agency, the Ontario Ministry of the Environment, and the New York State Department of Environmental Conservation (1999), the Four Parties, signed a Declaration of Intent (DOI). The purpose of the DOI is to achieve significant reductions of toxic contaminants in the Niagara River. Based on the DOI, a contaminant-specific Niagara River effort called the Niagara River Toxics Management Plan (NRTMP) was designed to achieve reductions in contaminant loadings to the Niagara River. Upstream/Downstream monitoring and biomonitoring, important subsets of the NRTMP, are conducted by Environment Canada and the Ontario Ministry of the Environment, respectively. Data from this monitoring of NRTMP implementation efforts provide evidence of progress toward the goals of the DOI.

Environmental problems in the Niagara River AOC include: inactive hazardous waste sites, contaminated sediment, combined sewer overflows, habitat degradation, and nonpoint source pollution, including urban and rural runoff (Environment Canada 1997) (U.S. EPA 1997).

Table 1, pursuant to Annex 2 of the Agreement, presents the 14 possible beneficial use impairments, their reported status by jurisdiction, and comments of the Commission concerning the reported status.

Setting and Sources of Contamination

The Niagara River is the connecting channel between Lake Erie and Lake Ontario. The flow of the drainage basin of the upstream Great Lakes system drains into the Niagara River. The Niagara River carries an average flow of approximately 200,000 cubic feet per second (5,666 cubic meters per second). This flow represents 83 percent of the tributary flow to Lake Ontario (New York State Department of Environmental Conservation 1994). Discharge from the Ontario portion of the AOC contributes less than 1 percent to the total flow in the Niagara River (Environment Canada 1997).

Prior to the 1940's, the Niagara River was subject to pollutants such as excessive levels of bacteria, oil, phosphorus, chloride, phenol, mercury and discoloration (NYSDEC 1994). During and after World War II, an increasing array of compounds were discharged from chemical plants to the municipal sewerage system. In its examination of the municipal/industrial waste situation, the Lakes Erie-Ontario Advisory Board (1967) to the Commission on Control of Pollution of Boundary Waters noted the complexity of rectifying this problem. At that time, waste received by the Niagara Falls, New York sewage treatment plant was 75 percent industrial in origin. Consequently, loading information for the sewage treatment plant indicated it to be a larger contributor to the trace organics load in the Niagara River than all Ontario point sources combined (Environment Canada and Ontario Ministry of the Environment 1981).

Numerous point sources primarily on the New York side historically discharged to the Niagara River. In 1981, 12 municipal wastewater treatment plants and 89 industrial facilities were permitted to discharge to the Niagara River or its tributaries (Environment Canada and Ontario Ministry of the Environment 1981). Within the New York drainage area of the Niagara River, over 310 industrial operations were documented to discharge via municipal wastewater treatment plants. The Buffalo River flows into Lake Erie near the headwaters of the Niagara River, hence pollution in the Buffalo River may contribute to water quality impairments of the Niagara River.

Land use in the Niagara River AOC includes industrial, residential, urban, agricultural, natural areas and parks. Most industrial dischargers are located within the New York portion of the AOC. Availability of abundant hydro power for industrial operations has resulted in a legacy of hazardous waste sites, the best known of which is Love Canal.

Table 1. Beneficial Use Impairments in the Niagara River Area of Concern

Condition	Areas of Concern Reported Status		IJC Status Assessment Observations
	Ontario[1]	New York[2]	
Restrictions on fish and wildlife consumption	Impaired	Impaired	Enhanced risk communication is needed in Ontario and New York
Tainting of fish and wildlife populations	Not impaired	Not impaired	Concur, no further investigation is required
Degradation of fish and wildlife populations	Impaired	Likely	New York status should be confirmed and detailed
Fish tumors or other deformities	Not impaired	Impaired	Documentation regarding the conclusion of each jurisdiction should be compared
Bird or animal deformities or reproductive problems	Impaired	Likely	The status of New York State populations should be confirmed
Degradation of benthos	Impaired	Impaired	Concur
Restrictions on dredging activities	Impaired	Impaired	The volume of any contaminated sediment in Ontario and New York should be quantified and cost estimates for an array of treatment alternatives should be presented to the public
Eutrophication or undesirable algae	Impaired	Not impaired	Documentation regarding the conclusion of each jurisdiction should be compared
Restrictions on drinking water consumption or taste and odour problems	Impaired	Not impaired	Documentation regarding the conclusion of each jurisdiction should be compared
Beach closings	Impaired	Not impaired	Documentation regarding the conclusion of each jurisdiction should be compared
Degradation of aesthetics	Not impaired	Not impaired	No further action is required
Added cost to agriculture or industry	Not impaired	Not impaired	No further action is required
Degradation of phytoplankton and zooplankton populations	Under assessment	Not impaired	The current status in Ontario waters should be confirmed
Loss of fish and wildlife habitat	Impaired	Impaired	Habitat losses in Ontario and New York should be quantified and an array of remedial options should be presented to the public

* accessed on January 16, 2001:

[1] http://www.on.ec.gc.ca/glimr/raps/connecting/niagara/intro.html

[2] http://www.epa.gov/glnpo/aoc/niagara.html

In the 1920s, a partially dug section of Love Canal, located in the southeast corner of Niagara Falls, New York, became a chemical and municipal disposal site for several chemical companies and the city of Niagara Falls (NYSDOH 1978). An unknown array and quantity of chemicals were buried on-site until the waste site was capped in 1953. Estimates of hazardous waste in this landfill range from 22,000 tons (19,954 tonnes) (U.S. EPA 1996) to 176,000 tons (159,632 tonnes) (Online Ethics Center 1999). In the late 1950s, homebuilding began adjacent to the Love Canal landfill, subsequently breaching the cap. By 1978, compounds identified at this site included: benzene, toluene, benzoic acid, lindane, trichloroethylene (TCE), dibromoethane, benzaldehydes, methyl chloride, carbon tetrachloride, and chloroform (NYSDOH 1978).

The Occidental Chemical-Hyde Park (then Hooker Chemicals and Plastics) site, from 1953 to 1975, received approximately 80,000 tons (72,560 tonnes) of chemical waste (U.S. EPA and NYSDEC 1999). This included approximately 0.7 tons (.6 tonnes) to 1.6 tons (1.5 tonnes) of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The former drainage stream of the landfill, Bloody Run, which flows into the Niagara River, was historically contaminated with organic chemicals including 2,3,7,8-TCDD. Compounds from this site, including 2,3,7,8-TCDD, were previously detected approximately 1,600 feet (488 meters) away in contaminated groundwater seeping from the Niagara River gorge face (U.S. EPA and NYSDEC 1999). After remediation, which included purge wells to capture aqueous-phase liquids at the gorge face, concentrations of 2,3,7,8-TCDD in t[illegible]rge face seepage are below the 10 micrograms per liter specified in the Record of Decision.

These and other waste sites contributed to extensive groundwater contamination problems that have adversely affected beneficial uses (see Table 1) in the Niagara River AOC. For example, the 102nd Street Landfill, a 22.4 acre (9 hectares) site, received about 23,500 tons (21,315 tonnes) of mixed organic solvents, organic and inorganic phosphates, and related chemicals in the period 1943 until 1971 (U.S. EPA and NYSDEC 2000). The presence of groundwater contamination is complicated by complex intersecting network of fractures and tectonic faults in the bedrock of the Niagara Frontier and the Western Lake Ontario basin (Yager and Kappel 1987). The deeply fractured bedrock that underlies the Niagara Region provides a direct pathway for groundwater contaminated by dense non-aqueous-phase liquids (DNAPL) to migrate from hazardous waste sites to the Niagara River and Lake Ontario (IJC 1993). Typical DNAPL components include: tetrachloroethylene, TCE, 1,2-dichloroethylene, trichloroethane, and carbon tetrachloride (NRC 1999). Substances, such as 2,3,7,8-TCDD and polychlorinated biphenyls (PCBs), also may be present. In addition, metabolites of carbon tetrachloride and TCE can be expected in dissolved-phase plumes emanating from certain DNAPL source zones (NRC 1999). For example, when TCE is not fully degraded, vinyl chloride is formed (NRC 2000). Vinyl chloride is more carcinogenic than TCE (NRC 2000).

Transport of contaminants by the Niagara River has resulted in downstream effects. Contaminant-related impacts of mirex and 2,3,7,8-TCDD, derived from Niagara River sources, to Lake Ontario fish and wildlife were noted as a concern by Environment Canada and Ontario Ministry of the Environment (1981). Contaminants from the Niagara River AOC, which previously migrated into the Niagara River, have been conveyed downstream to Lake Ontario. For example, the inventory of polychlorinated dibenzo-p-dioxins and dibenzofurans sequestered in Lake Ontario sediment has been estimated at 5,800 kilograms (12,787 pounds) (Pearson *et al.* 1997). Impacts to commercial fishing in specific areas within Lake Ontario due to Niagara River sources of mirex and PCBs were also identified.

In September 1976, the New York State Department of Environmental Conservation (NYSDEC) began investigation of issues related to Love Canal (NYSDOH 1978). By September 1978, scientific analyses had identified 82 chemical compounds in the landfill (NYSDOH 1978). In 1979, 215 chemical waste sites were identified in the Niagara and Erie counties area of New York. Of these, at least four are known to have leaked contaminants into the Niagara River (Environment Canada and Ontario Ministry of

the Environment 1981). In 1984, 164 sites within three miles (4.8 kilometers) of the Niagara River were considered as potential contaminant sources to the Niagara River (Niagara River Toxics Committee 1984).

Evaluation of the sites (U.S. EPA and NYSDEC 2000) identified 26 locations as significant hazardous waste sites responsible for over 99 percent of the estimated input from all such sites on the U.S. side of the Niagara River basin. Remediation of the sites is intended to virtually eliminate the migration of toxic pollutants from the sites. Current schedules call for all sites to be remediated by 2003 (U.S. EPA and NYSDEC 2000).

Human Health Considerations

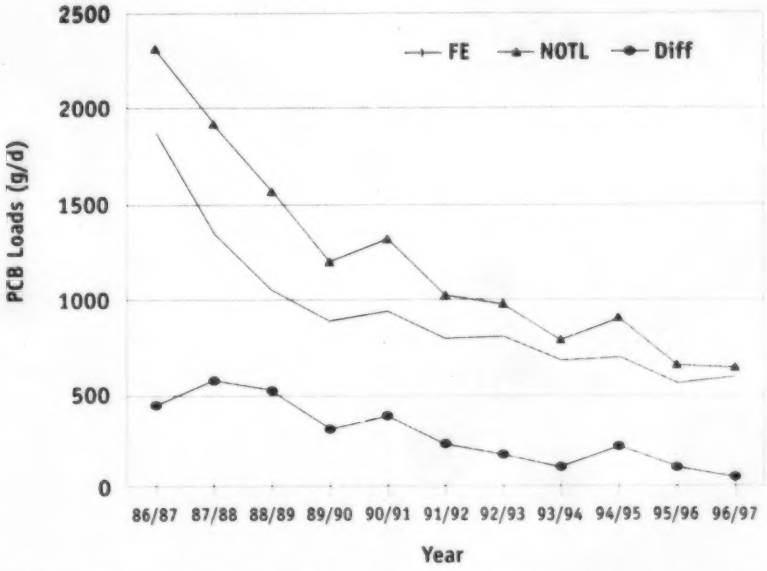
Uncontrolled hazardous waste sites have been documented as a major environmental and public health concern (Johnson and DeRosa 1997) (Lichtveld and Johnson 1993). Specifically in regard to the Love Canal area, health studies documented apparent increases in miscarriages (NYSDOH 1978) and low birth weight (Vienna and Polan 1984), and increased prevalence of seizures, learning problems, hyperactivity, eye irritation, skin rashes, abdominal pain, and incontinence (Paigen *et al.* 1985). The NYSDOH (2000) conducts follow-up health study activities and publishes a newsletter that serves as a health information clearinghouse for citizens.

Information on the general health status and selected health outcomes for populations living within the Ontario portion of the Niagara River AOC has been compiled (Health Canada 2000a). Consumption of sport fish caught from the Niagara River and downstream waters of Lake Ontario remains a principal route of human exposure to persistent toxic substances. Concerns were raised over risks to susceptible populations during the Commission's public consultation session conducted as part of the Niagara River Status Assessment. In particular, concern was expressed regarding non-English speaking urban poor who fish within the AOC and may consume sport fish on a subsistence basis. Contaminants of concern include 2,3,7,8-TCDD, PCBs, mirex/photo-mirex and mercury. It has been demonstrated that the consumption of PCB-contaminated foods is the most significant route of exposures to PCBs for the general population (NRC 2001). The human health implications associated with PCBs, the exposure to which occurs primarily through consumption of fish, have been documented by the Agency for Toxic Substances and Disease Registry and the U.S. Environmental Protection Agency in Johnson *et al.* (1999). Monitoring of PCB levels in juvenile fish from nine sites sampled since 1980 has shown decreases at each site (Niagara River Secretariat 2001).

The effectiveness of fish consumption advisories has been questioned (NRC 2001). Health Canada's Great Lakes Health Effects Program funded a survey of shoreline fishing and fish consumption in the Ontario portion of the Niagara River AOC. Of the fishers surveyed, 32 percent reported that they ate some, or all, of their catch during the previous 12 months (Health Canada 2000b). Of these fish consumers, the survey found that 33 percent of survey participants who had eaten their catch the previous year reported using the publication *Guide To Eating Ontario Sport Fish*. Accordingly, a considerable percentage of Niagara River shoreline fishers who consume their catch may not be aware of the up-to-date information contained in the *Guide To Eating Ontario Sport Fish* or the potential human health effects from eating contaminated fish. Recently, the Niagara Peninsula Conservation Authority, Ontario Ministry of Environment and Energy and Environment Canada have begun outreach efforts devoted to reaching and influencing fishers who read certain languages other than French or English.

Findings

The Commission's Status Assessment confirmed successes as well as challenges in the restoration of beneficial uses within the Niagara River AOC. Examples are detailed in the following section to document and promote successful activities and help meet any remaining challenges.



FE	Fort Erie, representing the contribution of sources in Lake Erie and upstream
NOTL	Niagara-on-the-Lake
Diff	Differential load (NOTL - FE), representing the contribution of Niagara River sources

Source: U.S. EPA, Region II

Figure 1: PCB Loads Entering Lake Ontario via the Niagara River

Notable Successes

Advances toward restoration of the Niagara River AOC were recognized during the Status Assessment. Notable successes are detailed below.

- **Considerable reductions in contaminant loadings have been achieved.**

  Implementation of the Niagara River Toxics Management Plan has resulted in significant reductions of the loading of toxic chemicals to the Niagara River. For example, it is estimated that actions by the New York State Department of Environmental Conservation and U.S. Environmental Protection Agency to remediate hazardous waste sites have resulted in a reduction of potential inputs to the River from hazardous waste sites by about 90 percent since 1989.

- **Significant contributions toward achieving the goals of the Lake Ontario Lakewide Management Plan have been made.**

  Loading reductions achieved through implementation of Niagara River Toxics Management Plan are contributing toward the goals of the Lake Ontario Lakewide Management Plan. Eighteen persistent toxic substances including PCBs have been targeted. Figure 1 demonstrates the reduction in contributions from Niagara River sources to the PCB load entering Lake Ontario via the Niagara River.

- **Long-term monitoring programs have been established and maintained.**

  Upstream/Downstream monitoring and biomonitoring conducted by Environment Canada and the Ontario Ministry of the Environment and Energy, respectively, provide scientifically defensible data that document the instream and downstream benefits that accrue due to remedial actions taken within the Niagara River AOC. For example, biomonitoring results have been useful in both identifying contaminated sediment problems and confirming the benefits of remedial efforts. As noted by the Commission's Science Advisory Board, these monitoring and surveillance programs should be considered for replication in the other Great Lakes connecting channels.

- **Unique binational division of labor arrangements have been utilized.**

  A unique division of labor between Environment Canada, Ontario Ministry of the Environment and Energy, U.S. Environmental Protection Agency Region 2, and New York State Department of Environmental Conservation toward implementation of the Niagara River Toxics Management Plan, has proved to be very cost effective. This activity is a notable example of binational cooperation toward achieving a common goal.

- **Implementation and outreach activities are evolving in an effective manner.**

  In Ontario, the federal and provincial governments are funding the Niagara Peninsula Conservation Authority (NPCA) to undertake the overall coordination and implementation of the Ontario side of the AOC. The NPCA has formulated and is implementing a comprehensive plan to address nonpoint pollution-related problems and habitat-related issues in the Welland River basin. A budget that adequately addresses these necessary actions has been developed. In New York State, as described below (in Funding A Comprehensive RAP Program), habitat creation or restoration activities have been initiated along the Niagara River. Public outreach is an important component of the AOC restoration effort. Outreach activities conducted by NPCA staff members are contributing to an increased public awareness of the RAP effort in Ontario. Outreach efforts by U.S. EPA's Niagara Falls Public Information Office on behalf of the Niagara River Toxics Management Plan, the Niagara River RAP and the Lake Ontario Lakewide Management Plan have contributed to the public's understanding of remedial programs in the Great Lakes basin.

Challenges to Restoring Beneficial Uses and Commission Recommendations

Challenges to a timely restoration of beneficial uses in the Niagara River AOC were noted during the Commission's Status Assessment process. Identified challenges and Commission recommendations are presented below.

Funding a Comprehensive Rap Program

The lack of secure long-term funding appears to be a challenge to both the Ontario and New York RAP efforts. The Commission commented in its Open Letter to Great Lakes Leaders in the Tenth Biennial Report that, "Although progress has been made, Governments have not committed adequate funding or taken the decisive actions required to restore and protect the Great Lakes."

Extensive investments have been directed toward the remediation of hazardous waste sites. To date, remediation efforts to address the remaining 26 priority hazardous waste sites have required expenditures in excess of $370 million (U.S.) with additional future costs estimated at over $261 million (U.S.) (U.S. EPA and NYSDEC 2000). The large amounts of funding made available for remediation of priority hazardous waste sites contrast sharply with funds made available for fish and wildlife habitat enhancement, control of combined sewer overflows and contaminated sediment remediation. The absence of dedicated RAP budgets to address these necessary remedial actions in the Niagara River AOC may impede overall progress toward addressing impaired beneficial uses. This lack of devoted funding appears to have affected both the New York and Ontario RAPs' efforts to fully restore beneficial uses in the Niagara River AOC. Fish and wildlife habitat restoration in the Ontario portion of the AOC, contaminated sediment remediation in New York waters and further control of combined sewer overflows in New York State are areas that clearly merit additional attention.

Efforts to restore instream fish and wildlife habitat within the AOC have been necessarily delayed due to the pressing need to first address severe contamination by persistent toxic substances. Habitat conditions of the Niagara River have been described (NYSDEC 1994) by the statement, "The loss of fish and wildlife habitat on the upper Niagara River has been dramatic." The Niagara River Remedial Action Plan Status Report (NYSDEC 2000) describes how an assessment of fish and wildlife habitat areas and funding through U.S. EPA and New York State resulted in the initiation of 11 habitat creation or restoration projects along the Niagara River. The initiation of these habitat projects is commendable and the Commission supports additional investments in this area.

Contaminated sediment contributes to the impairment of several beneficial uses in the Niagara River AOC. According to the 2000 Status Report (NYSDEC 2000), sediment remediation has been completed at three embayment sites and contaminated sediment has been removed at five locations along the Niagara River and lower reaches of its tributaries. Remedial actions have been initiated as areas of contaminated sediment are identified through monitoring and funding, usually from potentially responsible parties, is obtained. For example, contaminated sediment removal from Gill Creek has resulted in lower PCB levels in black crappie, largemouth bass, white perch, brown bullhead and bluegill. This remedial action contributed to the removal of a specific fish consumption advisory for Gill Creek (NYSDOH 1999). No dedicated funding mechanism exists to address contaminated sediment problems. Determination of the funding required to address the remaining contaminated sediment sites is needed in order to confirm the overall budget needed to address this environmental problem.

Combined sewer overflows (CSOs) are recognized as significant sources of water quality problems in the AOC. The city of Niagara Falls, Ontario is currently designing a full-scale demonstration project that will treat a CSO at the point of discharge rather than separating sewers. If successful, this option would provide treatment for a fraction of the typical cost. In Niagara Falls, New York, efforts to reduce CSO and groundwater flow from the Falls Street Tunnel to the Niagara River have reduced the input into the River of mercury by 70 percent, tetrachloroethylene by 85 percent, and four other priority chemicals by almost 100 percent, relative to the 1980s inputs (U.S. EPA and NYSDEC 2000). CSOs in the New York portion of the AOC continue to adversely impact water quality. Addressing these water quality impacts will be difficult and costly.

Recommendation

Quantify Remaining Needed Remedial Actions and Associated Budget Requirements.

To date, considerable expenditures have resulted in significant environmental benefits to the AOC and the downstream waters of Lake Ontario. In the New York portion of the AOC, substantial future expenditures will be required to more fully address issues such as fish or wildlife habitat, contaminated sediment and combined sewer overflows. An outline of the remaining major remedial actions with an estimate of associated funding needs and a subsequent commitment of funding would benefit the long-term effort to fully restore the beneficial uses in U.S. portion of the Niagara River AOC.

Coordination of Efforts to Restore Beneficial Uses

Through the implementation of the NRTMP, considerable progress has been achieved in reducing contaminant loading to the Niagara River. These actions have contributed to meeting goals of the two RAPs and to the restoration of beneficial uses in the AOC. While the agencies involved believe that the NRTMP has been well integrated with the two RAP efforts, the integration is not fully evident. Although improvements in coordination were noted during the Commission's Status Assessment process, it became apparent that many individuals continue to regard the two RAPs and the NRTMP as parallel mechanisms with little relationship to each other. Enhanced information sharing and reporting between the NRTMP and RAP efforts could provide more transparent accounting of the progress that has been achieved toward the goals of the NRTMP and restoration of beneficial uses. Similarly, enhanced information sharing between the Ontario and New York RAPs would provide the public with a more comprehensive overview of remaining actions that are needed to restore beneficial uses. The Implementation Annex for the Ontario portion of the AOC (November 2000) states that, "The RAP will re-establish a formal communication link with the New York State Niagara River RAP." This represents an opportunity to capitalize on the potential synergy between the RAP efforts to fully describe the benefits that have accrued through implementation of the NRTMP and outline future remedial actions.

Recommendation

Enhance Coordination of Efforts to Restore Beneficial Uses.

Greater attention should be directed to enhancing the public's knowledge of the integration of RAP efforts and the NRTMP. A suitable initial focus could be the NRTMP's contribution to the current status of beneficial use restoration in the Niagara River AOC.

Maintaining Public Awareness and Involvement

The general public and other decision-makers do not appear to be fully aware of the progress achieved by NRTMP and the two associated RAP efforts. Since 1996, the Commission has noted a general decline in public consultation activities within the AOC.

During the Commission's Status Assessment process, citizens informed the Commission of a lack of funding for public information activities in regard to the New York RAP. Ensuring that RAP efforts within the New York portion of the AOC achieve and maintain suitable visibility will require a greater dedication of personnel and funding. Public workshops and other visible events could be used to explain progress to date and the long-term benefits of fully restoring beneficial uses.

Representatives of the Niagara Peninsula Conservation Authority (NPCA) recently met with representatives of the U.S. EPA Niagara Falls Public Information Office (NFPIO) and future liaison between the two organizations may enable coordinated public information programs that more effectively target citizens within the AOC. The NPCA has recently demonstrated an effective outreach effort in their Welland River activities and the NFPIO has a long history of effective public outreach related to remedial programs.

The NRTMP activity is well funded, highly successful, and provides an annual reporting of progress, and, more importantly, through the NPCA and NFPIO, it affords considerable opportunity for public consultation. The Niagara River RAP efforts in New York and Ontario could benefit from increased support for public involvement.

Recommendation

Enhance Public Outreach Efforts.

A better integrated approach to public outreach is required. Planned coordination between the Niagara Peninsula Conservation Authority and U.S. EPA's Niagara Falls Public Information Office is an important step. Outreach efforts should explain the linkages between the two RAPs and the NRTMP. Progress made to date and the actions required to restore the beneficial uses need to be clearly outlined. A suitable theme might be "Progress Achieved and the Remaining Need".

Maintaining the Gains to Date

Containment and pump-and-treat systems are the engineered remedies of choice at the most critical hazardous waste sites in the Niagara River AOC and elsewhere in North America. Pump-and-treat requires continued investment in operation and maintenance (O&M) of the remedial system. These O&M activities can be expected to continue for decades and, in some cases, indefinitely (U.S. GAO 1995).

The Commission commends the implementing agencies for their success in achieving considerable reductions in the contaminant loadings to the Niagara River. However, as long as the contaminants remain in hazardous waste landfills located on the fractured bedrock close to the river there is a continuing risk of leakage to the Niagara River in the event of a major event such as an earthquake, technology failure or inability to maintain the funding required for operation and maintenance. Concern remains over the dense nonaqueous-phase liquids (DNAPLs) remaining in some containment sites. While promising technologies for treating DNAPL source zones and dissolved plumes emanating from DNAPL source areas have been identified by the National Research Council (NRC 1999), many of these technologies remain unproven particularly under the conditions present within the Niagara AOC.

The Commission remains concerned over the potential human health threat that is posed by the residual DNAPL contamination of some sites. Ongoing risk reduction efforts might benefit from more aggressive technology development and bench or pilot testing of alternative technologies.

Recommendation

Consider Appropriate Technologies for Long Term Solutions.

Companies and agencies need to continue assessing new technologies that might be appropriate for permanent solutions to ensure that contaminants from the existing hazardous waste sites do not migrate into the Niagara River and jeopardize the progress to date.

Concluding Remarks

The success of the Niagara River Toxics Management Plan (NRTMP) is an important, but under-publicized, Great Lakes remediation success story. The continued documentation provided by the upstream/downstream monitoring and related biomonitoring is needed to ensure the protection of beneficial uses as they are restored. The level of cooperation displayed by agencies in implementing the NRTMP serves as a model for cost-effective planning and implementation. In particular, its monitoring activities and progress reporting to the public should be considered a model for possible use elsewhere in the Great Lakes basin.

In order to fully restore beneficial uses in this connecting channel, a clear statement of required actions is needed and adequate funding, toward the timely implementation of the planned actions, is necessary. Enhanced efforts devoted to public consultation also are required. Continued coordination among the New York RAP, the Ontario RAP and the NRTMP will sustain public interest and maintain focus on the restoration of beneficial uses. Steps must also be taken to protect the considerable progress achieved in reducing the contaminants reaching the Niagara River from the hazardous waste sites.

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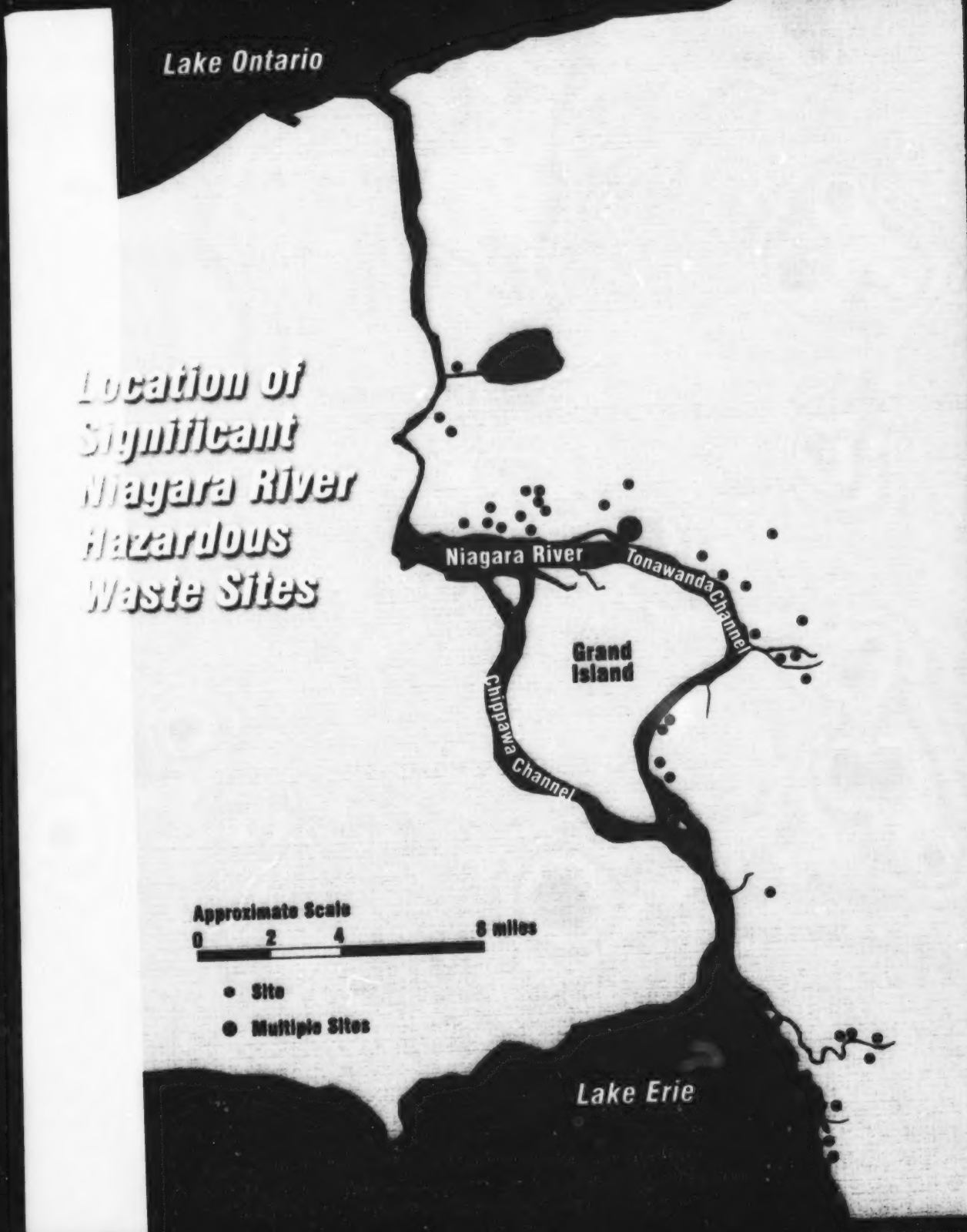
Schedule of Consultations

May 24, 2000	Representatives of New York State Department of Environmental Conservation, IJC Commissioner, Secretary of IJC's U.S. Section and IJC staff member
May 25, 2000	Representatives of U.S. Environmental Protection Agency, Region II, IJC Commissioner, Secretary of IJC's U.S. Section, and IJC staff member
November 15, 2000	Representatives of the Niagara Peninsula Conservation Authority and IJC staff members
November 29, 2000	Members of the Public, Mayor of Niagara Falls, NY, Representatives of Environment Canada, Ontario Ministry of Environment, U.S. Environmental Protection Agency, New York State Department of Environmental Conservation, IJC Commissioner, Secretary of IJC's U.S. Section, members of IJC's Science Advisory Board, and IJC staff members
January 10, 2001	Representatives of the Niagara Peninsula Conservation Authority, Niagara River Restoration Council, Niagara River Action Committee and Great Lakes United, IJC Commissioner, and IJC staff members
January 10, 2002	Representatives of Environment Canada, Ontario Ministry of Environment, U.S. Environmental Protection Agency, New York State Department of Environmental Conservation, and IJC staff members
April 30, 2002	Conference call with representatives of Environment Canada, Ontario Ministry of Environment, U.S. Environmental Protection Agency, New York State Department of Environmental Conservation and IJC staff members

Glossary of ACRONYMS

AOCs	Areas of Concern
CSO	Combined Sewer Overflow
DNAPL	Dense Nonaqueous-Phase Liquids
DOI	Declaration of Intent
IJC	International Joint Commission
NRC	National Research Council
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NFPIO	Niagara Falls Public Information Office
NPCA	Niagara Peninsula Conservation Authority
NRTMP	Niagara River Toxics Management Plan
O&M	Operation and Maintenance
PCBs	Polychlorinated Biphenyls
RAPs	Remedial Action Plans
TCE	Trichloroethylene
2,3,7,8-TCDD	2,3,7,8-tetrachloro-dibenzo-p-dioxin
U.S. EPA	United States Environmental Protection Agency
U.S. GAO	United States General Accounting Office


Lake Ontario
Location of Significant Niagara River Hazardous Waste Sites
Niagara River
Tonawanda Channel
Grand Island
Chippawa Channel
Approximate Scale
0 2 4 8 miles
Site
Multiple Sites
Lake Erie